

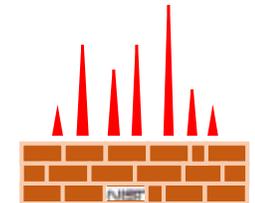


**American Academy of Forensic Sciences**  
Jurisprudence Section – Session “What Does the DNA Really Tell Us?”  
February 20, 2020                      Anaheim, CA



# Recent NIST Activities in Forensic Science: Examining Scientific Foundations and Innovation-to-Implementation Issues

John M. Butler & Robert M. Thompson  
*National Institute of Standards and Technology*  
Special Programs Office, Forensic Science Program



# Disclaimer & Acknowledgments

**Points of view are the presenters** and do not necessarily represent the official position or policies of the National Institute of Standards and Technology.

Certain commercial equipment, instruments and materials are identified in order to specify experimental procedures as completely as possible. In no case does such identification imply a recommendation or endorsement by the National Institute of Standards and Technology nor does it imply that any of the materials, instruments or equipment identified are necessarily the best available for the purpose.

***Acknowledgments:* NIST foundation review teams (DNA and firearms) and the DNA Mixture Resource Group for their insights**



# Presentation Outline

John

- NIST Activities in Forensic Science and Background Information
- **NIST Scientific Foundation Reviews**
  1. DNA Mixture Interpretation (Sept 2017 – present)
  2. Bitemark Analysis (Oct 2018 – present)
  3. Digital Evidence (Feb 2019 – present)
  4. Firearms Examination (Oct 2019 – present)

Robert

- **Research Innovation to Implementation (RI2I) Symposium**
  - Held June 19-20, 2019
- Future Activities: Forensics@NIST: November 5, 2020
  - Workshops (November 6)

# Forensic Science is 1 of 8 Featured Topics on NIST Website

<https://www.nist.gov/>

## FEATURED TOPICS



ADVANCED  
COMMUNICATIONS



ADVANCED  
MANUFACTURING



CYBERSECURITY



FORENSIC SCIENCE



HEALTH & BIOSCIENCE



QUANTUM SCIENCE



RESILIENCE



TECHNOLOGY TRANSFER



**STANDARD REFERENCE  
MATERIALS**



**STANDARD REFERENCE  
DATA**

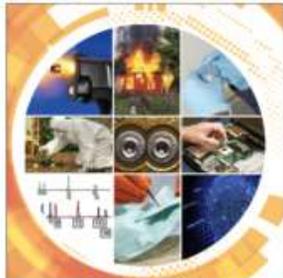


# NIST Forensic Science Activities

## Conduct Research and Collaborate

### Intramural Research

DNA  
Digital  
Fingerprints  
Firearms  
Footmarks  
Statistics  
Drugs/Toxins  
Trace



FORENSICS @ NIST

### Extramural Research

funding a NIST Center of Excellence in Forensic Science (CSAFE: since 2014)

1920s - present

## Partner with Community to Strengthen Policies and Practices

### National Commission on Forensic Science (NCFS) with DOJ

2013 - 2017



2014 - present

## Convene Meetings to Examine Issues



Human Factors Working Groups (with NIJ)

2009 - present

## Explore Scientific Foundations

Initial efforts with DNA mixture interpretation and bitemark analysis

NISTIR 8225 DRAFT

### NIST Scientific Foundation Reviews

John M. Butler  
Melissa K. Taylor  
Sheila Willis\*  
Special Programs Office  
Associate Director of Laboratory Programs

Hari Iyer  
Statistical Engineering Division  
Information Technology Laboratory

Peter M. Vallone  
Biomolecular Measurement Division  
Material Measurement Laboratory

Rich Press  
Public Affairs  
Director's Office

\*International Associate under contract; former director of Forensic Science Ireland

This publication is available free of charge from:  
<https://doi.org/10.6028/NIST.IR.8225-draft>

September 2018



U.S. Department of Commerce  
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology  
Walter Copan, NIST Director and Undersecretary of Commerce for Standards and Technology

2017 - present

<https://www.nist.gov/topics/forensic-science>

# NIST Research Focus Areas

## FORENSIC SCIENCE TOPICS

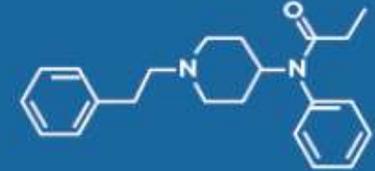
## Statistical Analysis



DNA & BIOLOGICAL  
EVIDENCE



FINGERPRINTS &  
PATTERN EVIDENCE



Drugs/Toxins



DIGITAL EVIDENCE



BALLISTICS



TRACE EVIDENCE

<https://www.nist.gov/topics/forensic-science>



# Example Press Release with a NIST Publication

*J Forensic Sci.* 2019 Oct 31 (published online)

JOURNAL OF **FORENSIC SCIENCES**

doi: 10.1111/1556-4029.14229

*J Forensic Sci.* 2019  
doi: 10.1111/1556-4029.14229  
Available online at: [onlinelibrary.wiley.com](http://onlinelibrary.wiley.com)

**PAPER**

**CRIMINALISTICS**

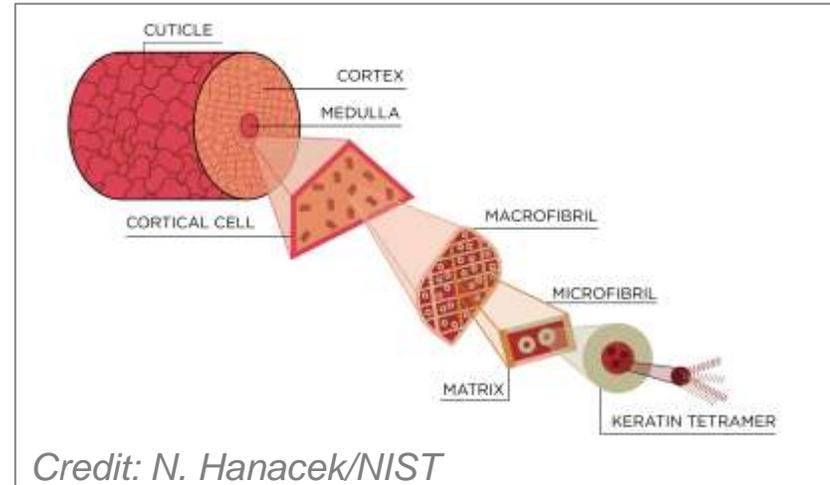
Zheng Zhang , M.D.; Meghan C. Burke, Ph.D.; William E. Wallace, Ph.D.; Yuxue Liang, Ph.D.; Sergey L. Sheetlin, Ph.D.; Yuri A. Mirokhin, Ph.D.; Dmitrii V. Tchekhovskoi, Ph.D.; and Stephen E. Stein, Ph.D.

Sensitive Method for the Confident Identification of Genetically Variant Peptides in Human Hair Keratin\*

## A Solution to a Hairy Problem in Forensic Science

November 05, 2019

By Rich Press (NIST science writer)



Other News Outlets



Ultrasensitive protein method lets scientists ID someone from a single strand of hair

By Eva Frederick

November 21, 2019

<https://www.nist.gov/news-events/news/2019/11/solution-hairy-problem-forensic-science>

“In an effort to make hair comparison a more useful technique for investigating crimes, scientists at the National Institute of Standards and Technology (NIST) have **developed a new way to dissolve hair proteins without destroying them**. Once in solution, the protein molecules from two hairs can be analyzed and compared, yielding objective, quantitative results. ...”

<https://www.sciencemag.org/news/2019/11/scientists-can-now-identify-someone-single-strand-hair>



# DNA & Biological Evidence



DNA Mixtures: A Forensic Science  
Explainer



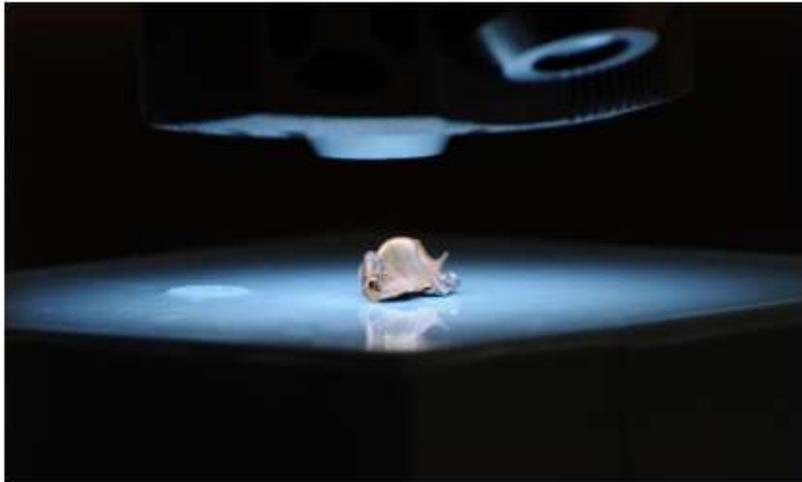
NIST Builds Statistical Foundation  
for Next-Generation Forensic DNA  
Profiling



Human DNA Standard: A Q&A With  
NIST's Becky Steffen (blog post)



# Ballistics (Firearms Examination)



Kennedy Assassination Bullets  
Preserved in Digital Form



NIST Updates Forensic Standard  
Reference Materials



How Good a Match is It? Putting  
Statistics into Forensic Firearms  
Identification

<https://www.nist.gov/topics/ballistics>

# Videos on Forensic Science Research



<https://www.nist.gov/video-gallery>

# Detective X Film awarded an Emmy® in 2018!

10 minute video: <https://www.youtube.com/watch?v=a97A44ORnrE>



<https://www.nist.gov/video/detective-x-re-discovering-wilmer-souder>

Article: <https://www.nist.gov/featured-stories/who-was-detective-x>

Awarded June 23, 2018 by the National Academy of Television Arts & Sciences: National Capital Chesapeake Bay Chapter



NIST staff members Leon Gerskovic, Robin Materese and Jose Garcia show off their Emmy® Award for "Detective X: (Re) Discovering Wilmer Souder."  
*Credit: J. Stoughton/NIST*

For more information on Wilmer Souder, see June 2016 colloquium:

<https://www.nist.gov/video/nist-colloquium-series-detective-x-wilmer-souder-and-early-history-forensic-science-national>

# CSAFE: NIST Center of Excellence in Forensic Statistics



**NIST has  
invested \$20M  
over 5 years  
(2015-2019)  
*renewal is under  
consideration***

<https://forensicstats.org/>

- + Blood Pattern Analysis
- + Digital Forensics
- + Fingerprints
- + Firearms and Toolmarks
- + Handwriting
- + Human Factors
- + Shoeprints and Treadmarks
- + Statistical Foundations
- + Training and Education



**Webinars:** <https://forensicstats.org/forensic-scientist-education-center/>

**Newsletters:** <https://forensicstats.org/news-events/monthly-csafe-newsletters/>

# OSAC: Organization of Scientific Area Committees for Forensic Science



OSAC Adds 25th Standard to the Registry



OSAC's Standards Bulletin - January 2020



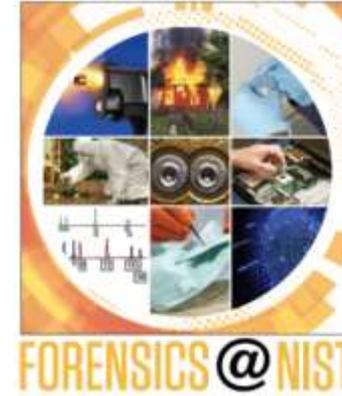
OSAC's October Newsletter & Annual Report



<https://lexicon.forensicosac.org/>  
>4,000 terms organized by forensic discipline

<https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science>

# NIST Has Organized Multiple Meetings to Assist the Forensic Science Community and Stakeholders



Held every two years to update everyone on NIST research efforts (2012, 2014, 2016, 2018)

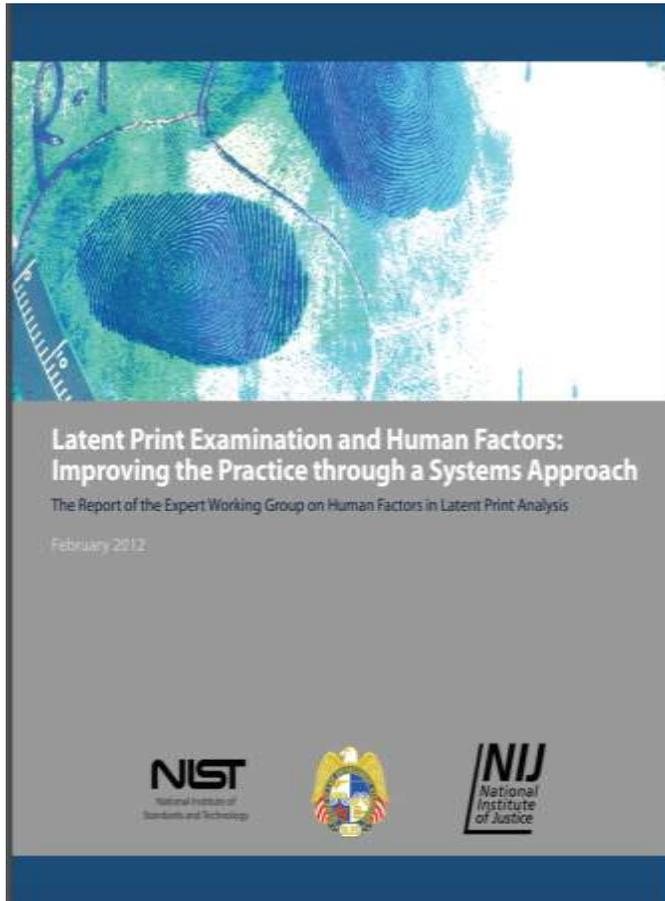


June 19-20, 2019

# Human Factors Working Groups

## Collaborative work with the National Institute of Justice

*Errors in pattern-based forensic science disciplines can be mitigated through management of potentially biasing information*

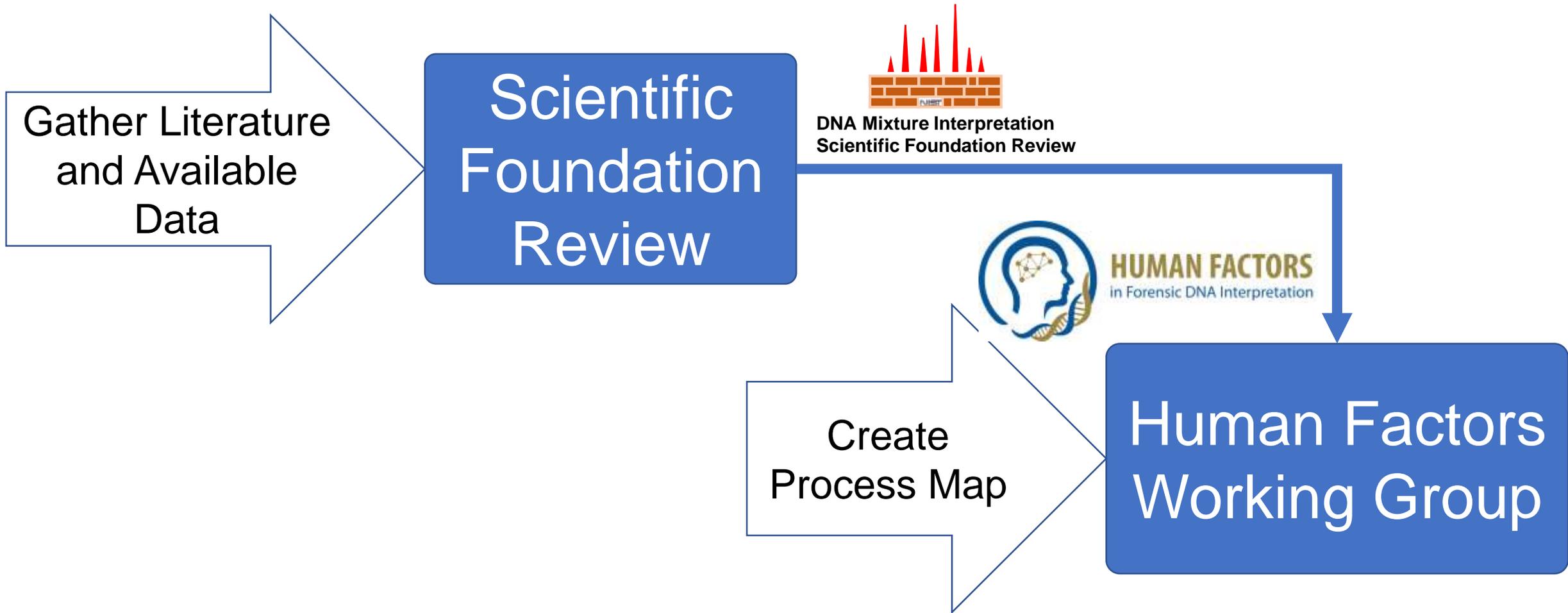


<https://nvlpubs.nist.gov/nistpubs/ir/2012/NIST.IR.7842.pdf>

- **Latent Print Examination** (February 2012)
- **Handwriting Analysis** (February 2020)
- **DNA Interpretation** (started in February 2020)
- **Firearms Examination** (starting in late 2020)

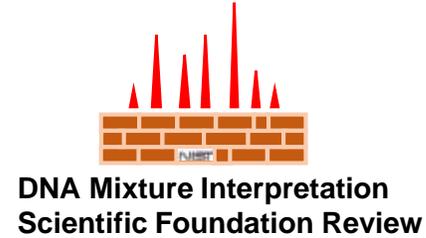
**Process maps (being) developed for each of these forensic disciplines**

# Inputs and Relative Relationships of Efforts



Gather Literature  
and Available  
Data

Scientific  
Foundation  
Review



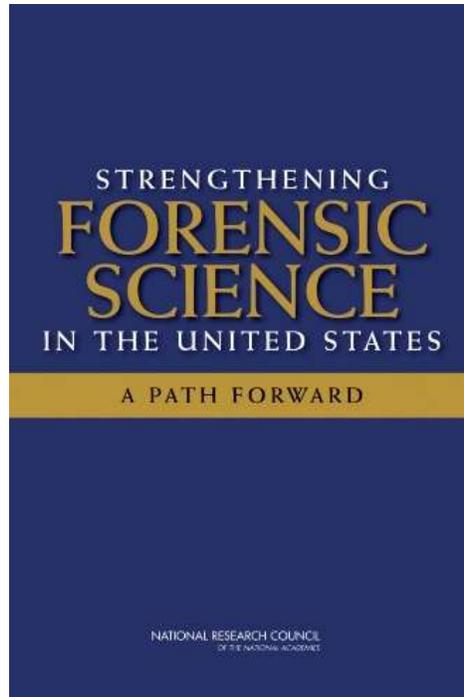
Create  
Process Map

Human Factors  
Working Group



# Requests for Understanding What Data Exists Supporting Forensic Science Methods

NRC Report (2009)



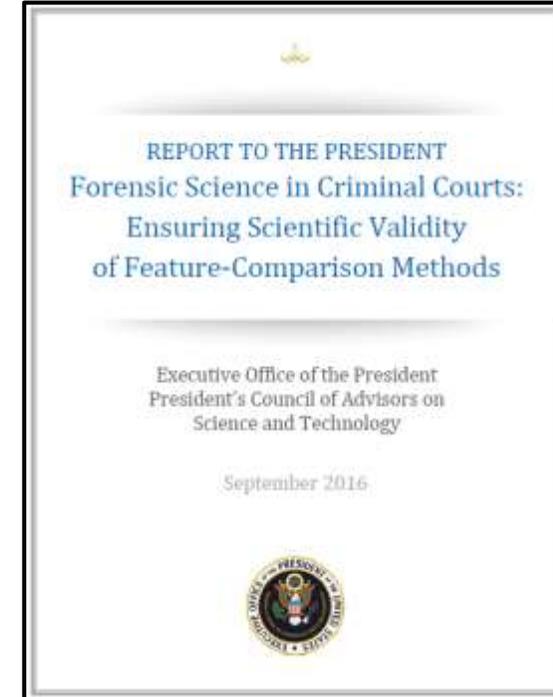
“demonstrating the validity of forensic methods”  
(Recommendation #3)

NCFS Recommendation (2016)



“technical merit evaluation”

PCAST Report (2016)



“establishing foundational validity”

**NIST: a “Scientific Foundation Review”**

# Plans for our NIST Scientific Foundation Reviews

**NISTIR 8225 DRAFT**

**NIST Scientific Foundation Reviews**

John M. Butler  
Melissa K. Taylor  
Sheila Willis\*  
*Special Programs Office  
Associate Director of Laboratory Programs*

Hari Iyer  
*Statistical Engineering Division  
Information Technology Laboratory*

Peter M. Vallone  
*Biomolecular Measurement Division  
Material Measurement Laboratory*

Rich Press  
*Public Affairs  
Director's Office*

\*International Associate under contract, former director of Forensic Science Ireland

This publication is available free of charge from:  
<https://doi.org/10.6028/NIST.IR.8225-draft>

September 2018

**Published  
September 24, 2018**

  
U.S. Department of Commerce  
*Wilbur L. Ross, Jr., Secretary*

National Institute of Standards and Technology  
*Walter Copan, NIST Director and Undersecretary of Commerce for Standards and Technology*

<https://doi.org/10.6028/NIST.IR.8225-draft>

- Outlines our plans to conduct studies and report findings along with historical overview of previous efforts (NAS, SoFS, PCAST, AAAS) and similar international activities
- **Feedback sought on our draft**
- Public Comment Period held
  - September 24 to November 19, 2018
  - **13 responses received (27 pages)**

[https://www.nist.gov/system/files/documents/2019/02/12/draft\\_nistir\\_8225\\_comments\\_received.pdf](https://www.nist.gov/system/files/documents/2019/02/12/draft_nistir_8225_comments_received.pdf)

**Public comments received**  
**on Draft NISTIR 8225**  
**NIST Scientific Foundation Reviews**  
Published February 12, 2019

# NIST Pilot Plans for Technical Merit Evaluation

• Initial NIST efforts would look at three examples selected from different areas, as we learn if the approach can be effective:

- DNA
- Firearms
- Bitemarks

- **Seek input from a variety of experts**
- **Conduct a literature review**
  - Reference list will be publicly available as part of the study findings
- **Evaluation of literature claims**
- **Conduct interlaboratory studies**
  - Where possible, assess quality of work in operation – with de-identified participants
- **Publish findings and recommendations**
- **Provide training for judges, lawyers, jurors, practitioners, ...**
  - Develop training aids to convey the capabilities and limitations of studied forensic disciplines

# NCFS “Technical Merit Evaluation” Recommendations

(Approved by NCFS Sept 12, 2016)

- **Recommendation #1: NIST should establish an in-house entity** with the capacity to **conduct independent scientific evaluations of the technical merit of test methods and practices** used in forensic science disciplines.
- **Recommendation #2: The results of the evaluations will be issued by NIST as publicly available resource documents.** NIST’s evaluation may include but is not limited to: **a) research performed by other agencies and laboratories, b) its own intramural research program, or c) research studies documented in already published scientific literature.** NIST should initially begin its work by piloting three resource documents to establish their design and requirements. The release of these documents should be broadly disseminated in the scientific and criminal justice communities and accompanied by judicial trainings.

# Similar Efforts by Other Groups



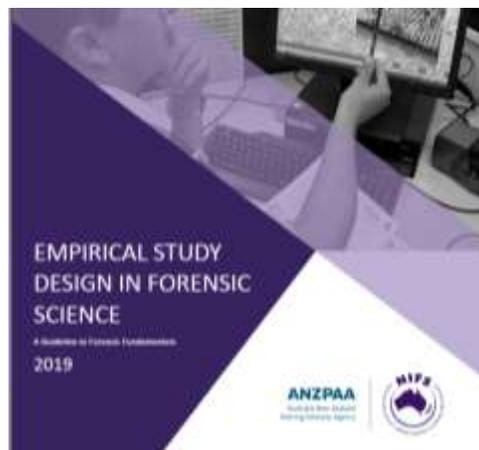
Fire Investigation  
(July 2017)



Latent Fingerprints  
(Sept 2017)



Forensic Fundamentals  
(Nov 2016)



Empirical Study  
Design (Sept 2019)

- **AAAS**

With funding from the Arnold Foundation, AAAS conducted two gap analysis studies:

- **Fire Investigation** (published in July 2017)
- **Latent Prints** (published in Sept 2017)

<https://www.aaas.org/page/forensic-science-assessments-quality-and-gap-analysis>

- **NIFS (Australia/New Zealand)**

- In 2016, started a forensic fundamentals gap analysis (beginning with anthropology, document examination, shoemark comparison, and bloodstain pattern analysis)
- In 2019, shared empirical study design ideas

<http://www.anzpaa.org.au/nifs>

# NIST Scientific Foundation Reviews Underway

## 1. DNA Mixture Interpretation (initial pilot study)

- Began in September 2017
- AAFS 2019 and ISHI 2019 workshops conducted
- *Report being drafted...*

## 2. Bitemark Analysis

- Began in October 2018
- Workshop held in October 2019

## 3. Digital Evidence

- Began in February 2019
- Interlaboratory study announced in February 2020

## 4. Firearms Examination

- Began in October 2019
- Gathering literature and information on error rate studies

**Reports will be  
provided with each  
foundation review**

# Initial Concerns Raised by Some Regarding Our Initial DNA Project

- Everything is fine with DNA – leave it be
- There are standards for DNA interpretation already
  - **FBI QAS 2011 9.6.4** Laboratories analyzing forensic samples shall have and follow a documented procedure for mixture interpretation that addresses major and minor contributors, inclusions and exclusions, and policies for the reporting of results and statistics.
- You need additional experts working on this study
- Available information is being ignored, such as unpublished validation studies

# Purpose of our DNA Mixture Interpretation Review

## Primary Goals:

- 1. Develop a bibliography of relevant literature**
2. Define underlying principles, characterize capabilities and limitations of methods for mixture analysis
3. Identify knowledge gaps for future research
4. Inform the forensic community and non-specialists of findings (judges, attorneys, & general public)
- 5. Create a framework for potential future NIST foundational reviews in forensic science (others have already started)**

**Workshop conducted: Feb 2019 (AAFS) and Sept 2019 (ISHI)**  
***Working to complete a draft report for release...***

# AAFS Workshop (February 2019)

## DNA Mixture Interpretation Principles: Observations from a NIST Scientific Foundation Review

Chair: John M. Butler (NIST),

Co-Chair: Sheila Willis (NIST Guest Researcher)

**8 hours, 17 presenters, 19 talks, 406 slides**



<https://strbase.nist.gov/AAFS2019-W10.htm>

**Speakers** (*left-to-right*):  
**NIST team & Resource Group**

Joel Sutton (DFSC)

Jack Ballantyne (UCF)

Keith Inman (Cal State East Bay)

**John Butler** (NIST)

Lisa Schiermeier-Wood (VA DFS)

**Peter Vallone** (NIST)

**Melissa Taylor** (NIST)

Ray Wickenheiser (NYSP)

Robin Cotton (BU)

Bruce Heidebrecht (MSP)

**Hari Iyer** (NIST)

Eugene Lien (NYC OCME)

**Sheila Willis** (NIST associate)

Jennifer Breaux (MoCo, MD)

Charlotte Word (consultant)

Roger Frappier (CFS-Toronto)

**Rich Press** (NIST)

Resource Group members not pictured:

Todd Bille (ATF Laboratory)

Tamyra Moretti (FBI Laboratory)

# ISHI Workshop (September 2019)

ISHI WORKSHOP  
September 26, 2019  
Palms Springs, CA

*Elevating  
Forensics  
— FOR 30 YEARS —*

ISHI INTERNATIONAL SYMPOSIUM  
ON HUMAN IDENTIFICATION  
PALM SPRINGS, CA | SEPTEMBER 23-26, 2019

## DNA Mixture Interpretation Principles and Best Practices

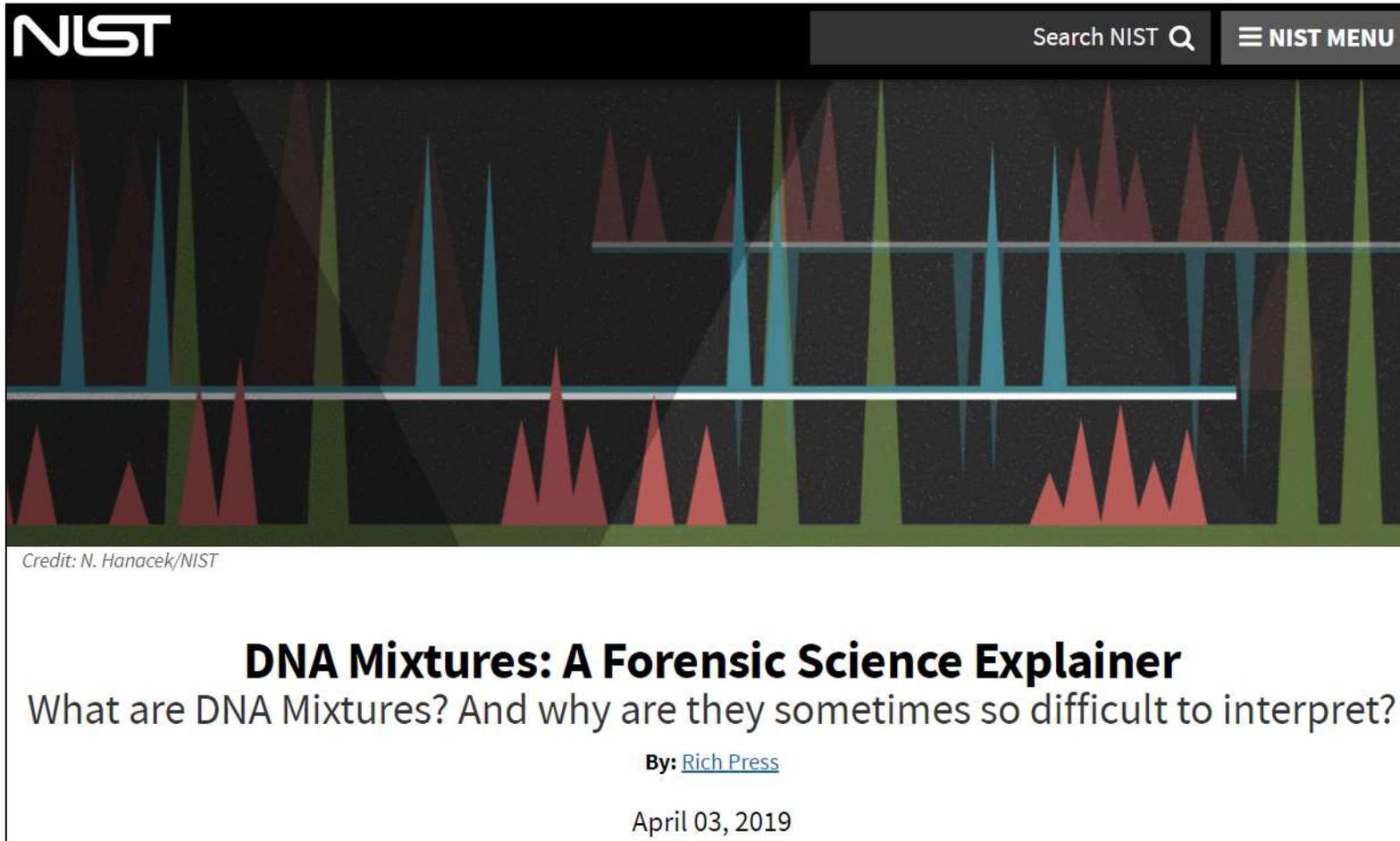
John M. Butler, PhD  
Hari K. Iyer, PhD  
Sheila Willis, PhD



**3 hours, 3 presenters, 167 slides**

[https://strbase.nist.gov/pub\\_pres/ISHI2019-MixtureWorkshop.pdf](https://strbase.nist.gov/pub_pres/ISHI2019-MixtureWorkshop.pdf)

# NIST DNA Mixtures Explainer



**NIST** Search NIST NIST MENU

*Credit: N. Hanacek/NIST*

## DNA Mixtures: A Forensic Science Explainer

What are DNA Mixtures? And why are they sometimes so difficult to interpret?

By: [Rich Press](#)

April 03, 2019

## Topics Covered

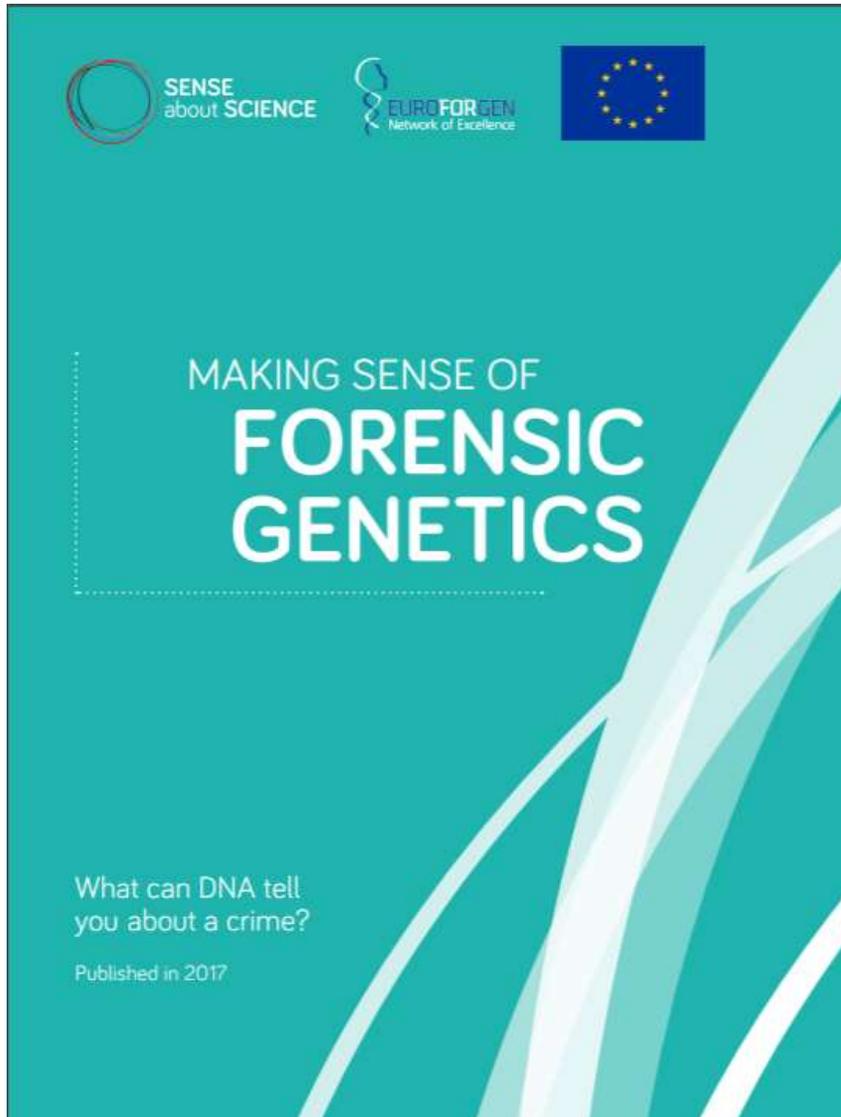
- Why have DNA mixtures and trace DNA become so prevalent?
- Are all DNA mixtures difficult to interpret?
- Why are complex DNA mixtures difficult to interpret?
- UNCERTAINTY #1: When is a peak a peak?
- UNCERTAINTY #2: Whose peak is it anyway?
- What is probabilistic genotyping software, and how does it help?
- How confident can one be that the DNA is related to the crime?
- Should labs just stop analyzing complex DNA mixtures altogether?



<https://www.nist.gov/featured-stories/dna-mixtures-forensic-science-explainer>

# Making Sense of Forensic Genetics (2017)

concepts clearly explained in 40 pages

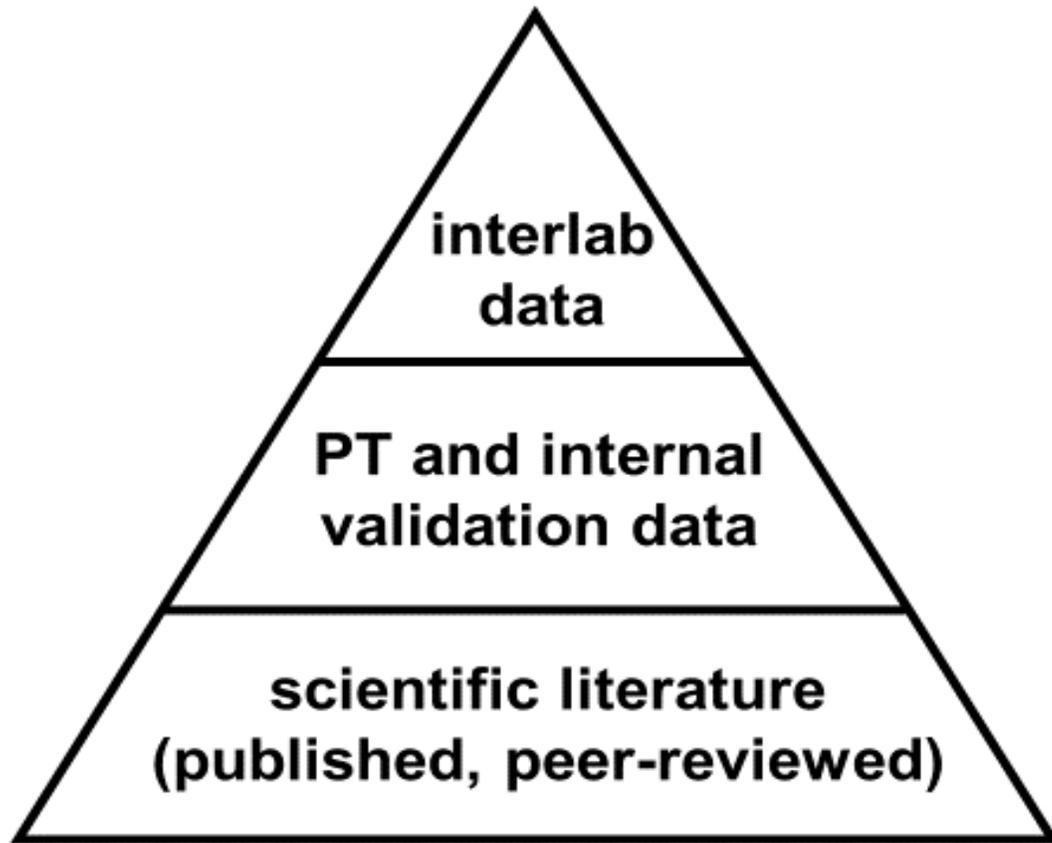


- Developed by European Forensic Genetics Network of Excellence (EuroForGen-NoE) and published with Sense about Science
- **Free PDF file** available for download  
<https://senseaboutscience.org/wp-content/uploads/2017/01/making-sense-of-forensic-genetics.pdf>
- *Final point made:* “As DNA profiling continues to grow more sensitive, and it is used in more investigations, **the need for accurate communication between scientists and nonscientists only grows** - both **to ensure that their expectations of the technology are realistic, and its limits are properly understood...**”

# Lots of Change in the Past Few Years for DNA Mixture Interpretation...

- Growth of **probabilistic genotyping software (PGS)** use throughout the U.S. forensic DNA community
  - >50 U.S. laboratories now using STRmix, TrueAllele, or Lab Retriever
- Many new publications on theory and data behind probabilistic genotyping models (primarily those used in STRmix)
- Widespread adoption of new STR megaplex kits and in some cases new CE instrumentation that has required additional validation studies
- New guidelines and standards released and in development (e.g., SWGDAM 2017, FBI QAS 2020)

# Data Resources Sought for Examination in Our Review



An illustration of general relationships for information in support of a method and its use

Interlaboratory data reveal the degree of reproducibility with a method across multiple laboratories.

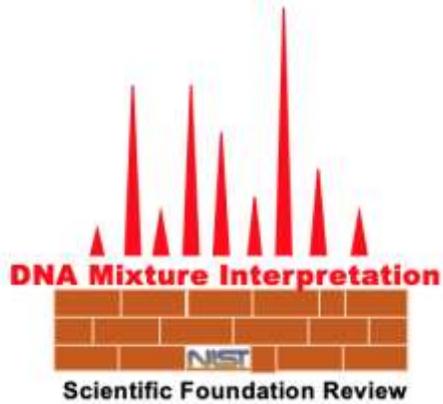
Proficiency test (PT) and internal validation data demonstrate the ability to obtain reliable results under specific laboratory conditions in a single laboratory.

Published articles in peer-reviewed scientific journals typically establish the broad base of what is possible.

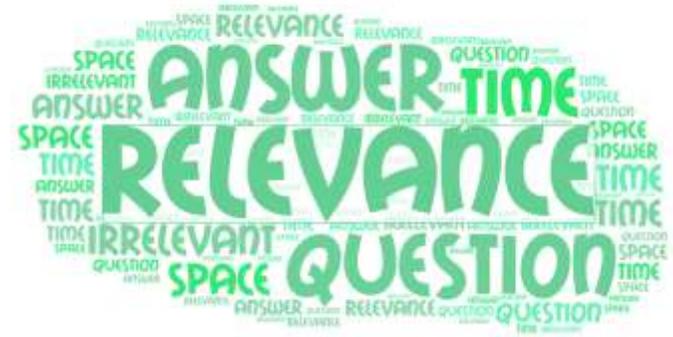
# Initial Draft Report (*too long* → *being revised*)

- Executive Summary, Acknowledgments and Disclaimer
- Introduction to the Review
- DNA Mixture Principles and Practice
- Data Sources
- Reliability (validation and LR discrimination & calibration)
- Relevance (DNA transfer & activity)
- New Technologies (potential & limitations)
- **Appendix 1:** Relevant Literature Listing (**currently 631 references**)
- **Appendix 2:** DNA Basics & Glossary (**currently 122 terms defined**)

*Other potential appendices or ancillary documents are being considered as well*



# Foundation Study on DNA Mixtures



- Increased sensitivity had two immediate consequences
  - 1) Need to deconvolute mixtures which were more prevalent because more DNA was detected
  - 2) Information needed on transfer to help assess the **relevance** of the recovered DNA
- Most of the literature is concentrated on the first point
- The second point is particularly important for mixtures when at least some of the contributing genotypes are likely to be irrelevant

# Bitemark Analysis Foundation Review

## Bitemark Thinkshop

(Oct 17-18, 2019)



## Literature Review

(underway)



Forensic Technology  
CENTER OF EXCELLENCE

A program of the National Institute of Justice.

## TOPICS DISCUSSED IN THINKSHOP

Science Question 1 (Understanding Dentition): **Are there measurable characteristics or features in human dentition that vary among individuals and are persistent within an individual?**

Science Question 2 (Understanding Bitemarks): **Do bitemarks transfer measurable characteristics of the dentition to the substrate?**

Science Question 3 (Data Interpretation Strategies): **What interpretation strategies (techniques and practices) produce the most accurate and reliable results?**

# Digital Evidence Foundation Review

- A digital evidence interlaboratory study was announced this morning in the Digital & Multimedia Sciences section

## DIGITAL & MULTIMEDIA SCIENCES

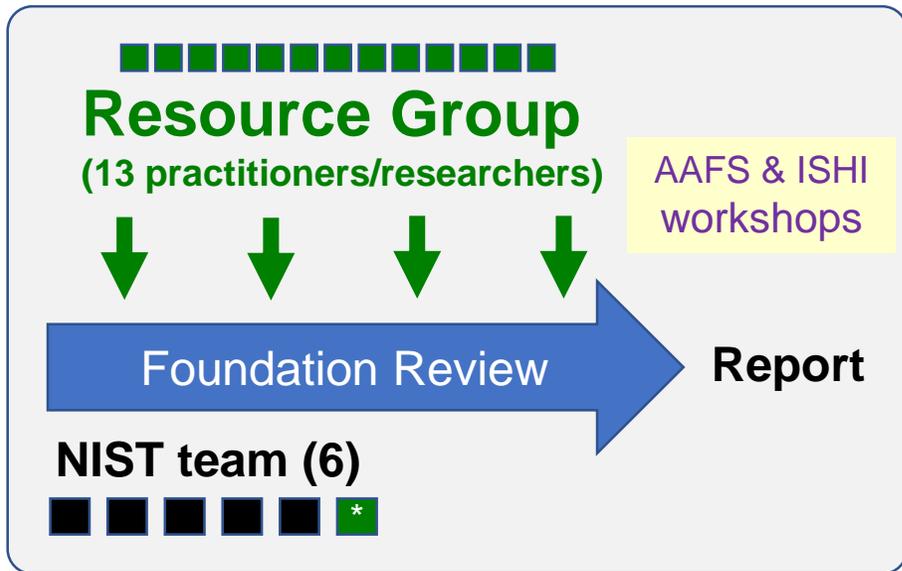
Presentation C7 (Thursday, February 20, 9:35-9:50am)

**The National Institute of Standards and Technology  
(NIST) Scientific Foundation Study for Digital Examiners**

*Barbara Guttman, BA\*; Mary T. Laamanen, MS\*; Craig Russell, MS*

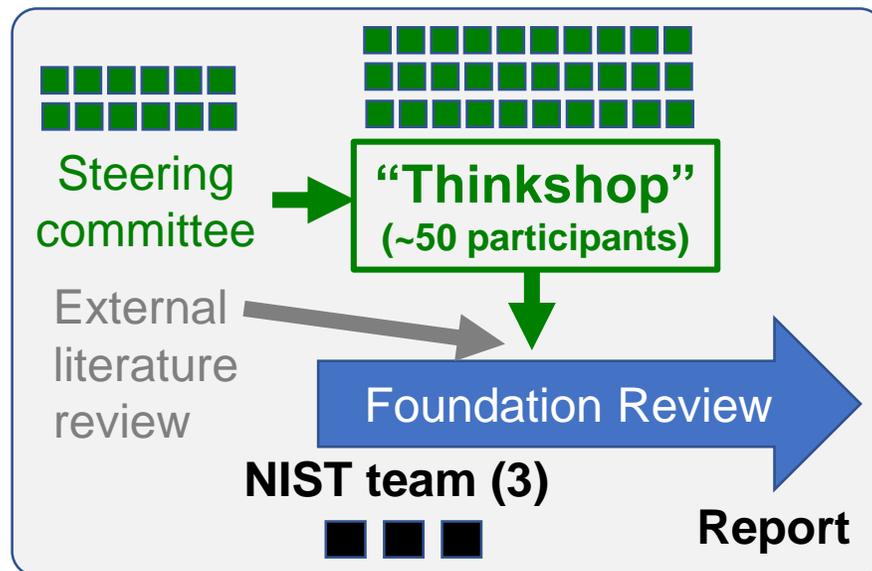
# Models for Community Involvement & Input

## Model 1



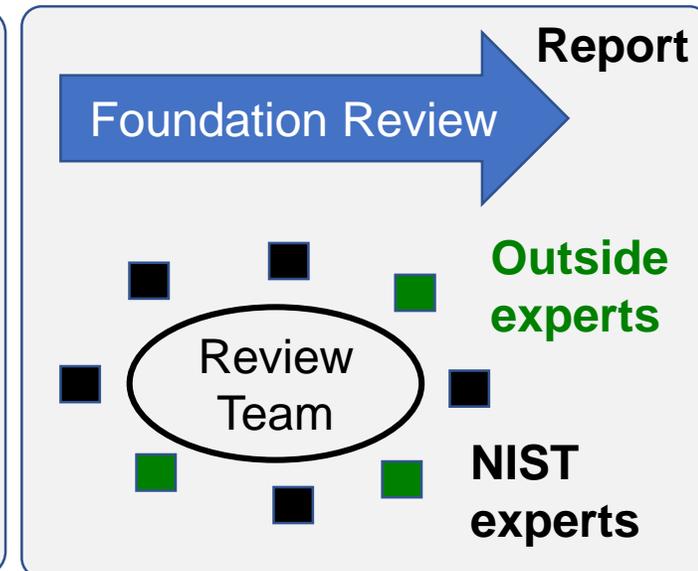
DNA Mixture Interpretation

## Model 2



Bitemark Analysis

## Model 3



Firearms Examination

# Firearms Examination Core Team Members

#	Team Member	Association
1	<b>Ted Vorburger</b> (chair)	NIST contractor (retired NIST researcher)
2	Robert Thompson	NIST researcher (formerly ATF firearms examiner)
3	James Yen	NIST statistician
4	Steve Lund	NIST statistician
5	John Butler	NIST researcher ( <i>connection to DNA review</i> )
6	Shannan Williams	NIST researcher
7	<b>Wayne Arendse</b>	DC Dept of Forensic Sciences (firearms examiner)
8	<b>Greg Klees</b>	ATF Laboratory (firearms examiner)
9	<b>Heather Waltke</b>	NIST contractor ( <i>connection to future NIST/NIJ Firearms Human Factors Working Group</i> )

# Firearms Examination Foundation Review



*Marks on cartridge cases and bullets*

## **SCOPE:**

**Review of the scientific foundations for the forensic analysis and identification of firearms evidence**

***403 references collected for consideration as of February 6, 2020***

# Firearms Examination Scope Discussions

## What is in:

1. Comparison methods
2. Comparison microscopy as applied to both bullets and cartridge cases
3. Regions of interest
  - tool working surface to include breech face, firing pin, barrel rifling, chamber, extractor/ejector, magazine lip
  - ammunition manufacturing marks, surface features
4. Statistical approaches
5. Algorithmic comparison methods

# Firearms Examination Scope Discussions

## What is not in:

1. Non-firearms tool mark evidence (e.g., chisel marks)
2. Firearm classification (e.g., barrel length, caliber)
3. Shooting scene reconstruction
4. Gun shot residue (GSR)
5. Trace metal profiling
6. Automated investigation methods (e.g., NIBIN)

# Bullet Black Box Study

Conducted by NIST and Noblis to measure the accuracy and reproducibility of conclusions by firearms examiners in comparing bullets.

**Each participant will conduct 100 comparisons,** using physical samples (fired bullets, mailed to participants), with responses entered on the study website.

*Interested?*

***[firearms@noblis.org](mailto:firearms@noblis.org)***



# Research Innovation to Implementation (RI2I)

Forensic Science Research Innovation to Implementation Symposium



NIST / Gaithersburg, MD / June 19-20, 2019/ NIST.GOV/RI2I

NIST Special Publication 2100-02

**Notes from the NIST Research  
Innovation to Implementation in  
Forensic Science Symposium (RI2I)**  
June 19-20, 2019

Richard R. Cavanagh, PhD  
*NIST Special Programs Office*

Aislinn Berge, MFS  
Amanda Coute, MFS  
Ron Fazio, MBA  
Timothy Graham, MFS  
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# Notes from RI2I Meeting

- **Meeting held June 19-20, 2019** at NIST with ~100 attendees
  - Breakouts facilitated and discussions captured by SNA International
- 59 page document
- **Published in November 2019** as a NIST Special Publication
  - <https://doi.org/10.6028/NIST.SP.2100-02>

# RI2I Purpose and Perspectives Sought

- For crime laboratories, transferring forensic science research into practice is a challenging problem. Thousands of research papers are published in forensic science journals every year, yet **many innovations never make it to the crime lab.**
- What can the forensic science community do differently so that new technologies come online faster? **How can we reduce the obstacles to successful innovation?**

**Two breakout sessions** conducted with participants

## Research Perspective

Glen Jackson (WVU)

Gene Peters (FBI)

## Lab Management Perspective

Jenifer Smith (DC)

Edward “Chip” Pollock (Sacramento)

## Business Perspective

Barry Logan (NMS Labs)

Amy Liberty (ThermoFisher Scientific)

## Courts Perspective

Stephanie Domitrovich (Judge)

Dawn Boswell (Prosecutor)

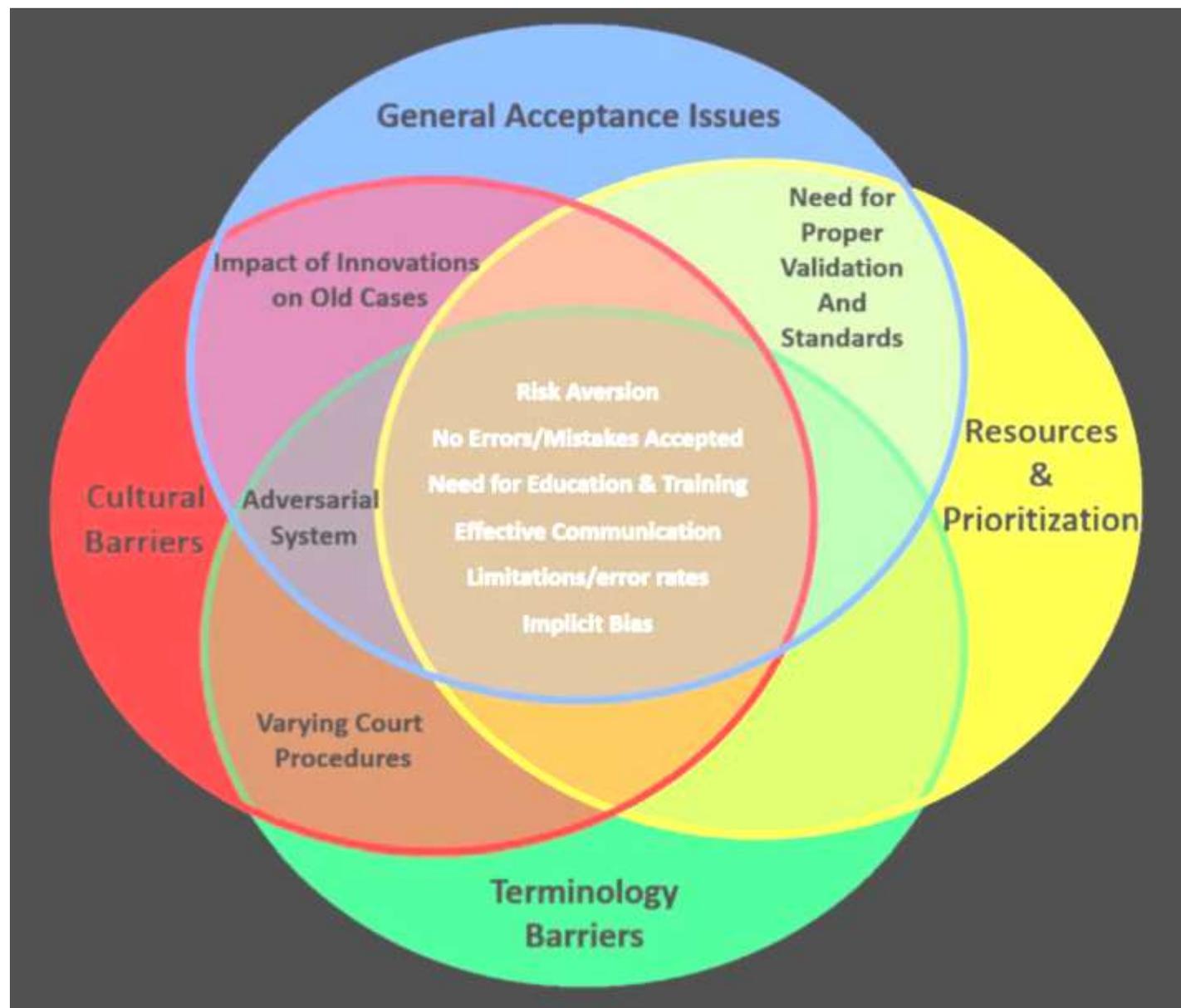
## International Perspective

Robert Morgan (Australia)

Gillian Tully (UK)

# Court Perspective on Barriers in Implementing New Technology

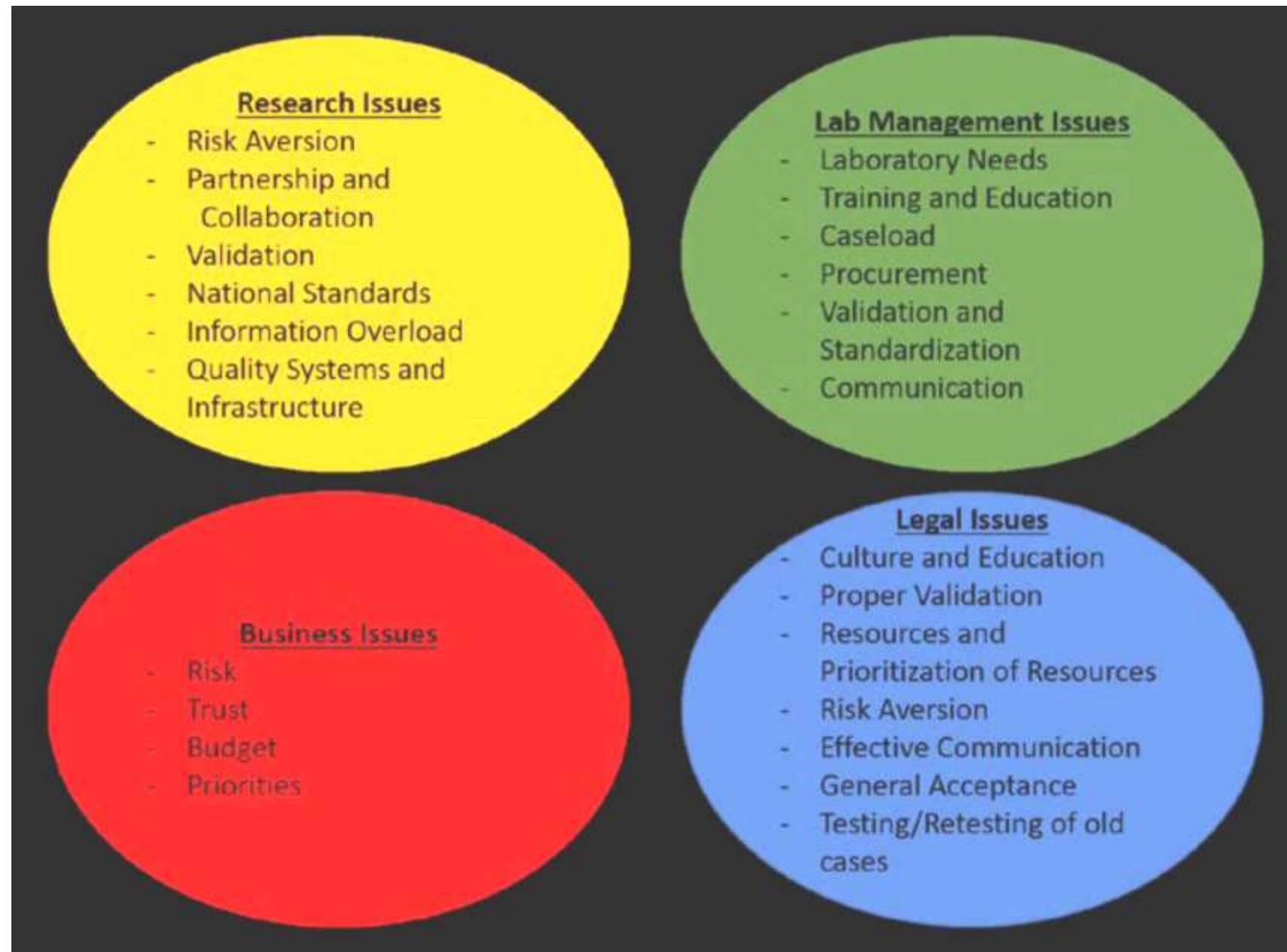
***Risk aversion is an  
important factor***



<https://doi.org/10.6028/NIST.SP.2100-02> (Figure 1, p. 33)

# Breakout Session A Discussion Points

A common theme discussed in each group was **communication** and the gap that can exist between stakeholders



# Some Ideas Discussed

- **Explore the creation of a national organization (e.g., National Laboratory) that could potentially serve as a resource for all forensic laboratories preparing to implement a new technology**

**This organization could provide support by:**

- 1. Reviewing and evaluating new innovations so that every laboratory manager does not have to perform the same tasks individually**
- 2. Serving as a repository for information including:**
  - a) Cost-benefit analyses**
  - b) Validation studies**
  - c) Return on investment (ROI) studies**
  - d) Standard operating procedures**
  - e) Other pertinent documents that may streamline the implementation process for a busy and often overworked laboratory**

# Possible Next Steps (1)

- 1. Investigate ways to enhance communication between forensic stakeholders**
- 2. Investigate ways to incentivize researchers and businesses to implement technology that is helpful and tailored to forensic laboratories**

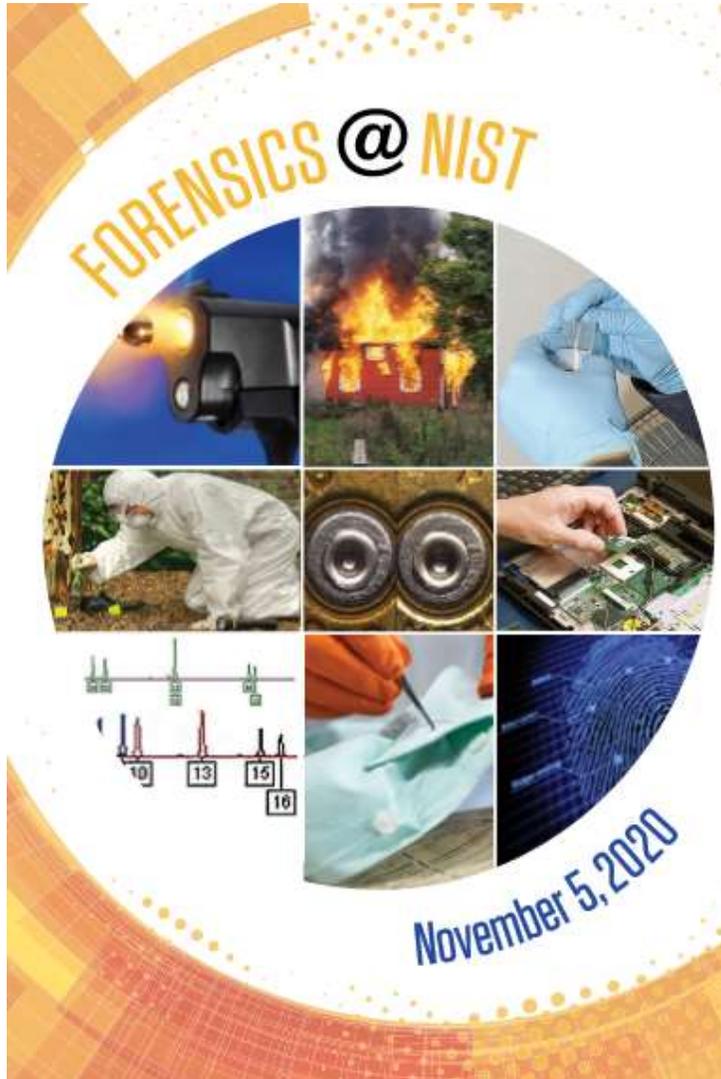
**This may include incentives for work with forensic practitioners to address and overcome operational challenges faced by forensic laboratories**

# Possible Next Steps (2)

- **Assessing laboratories periodically to help determine where they have gaps and recommend what new technology might be helpful**
- **Developing solutions to terminology differences among researchers, operational personnel, and courts**
- **Supporting validation studies by providing:**
  - **Guidance for validation studies**
  - **Validation samples**
  - **External review services**
- **Making equipment available for laboratories to evaluate**
- **Providing centralized training to educate stakeholders (e.g., courts on new technology, researchers and scientists on court admissibility and general acceptance, researchers on operational challenges and the need for new technology)**

**Considering a  
Validation Workshop  
for June 2021**

# Forensics@NIST 2020



## SAVE THE DATE

### NEW FORMAT THIS YEAR: BREAKOUTS BY TOPIC AREA

Join us for Forensics@NIST, where you will have the **onsite exclusive one day** opportunity to meet our scientists and learn how they are using advanced methods in metrology, computer science, and statistics to strengthen forensic science. An optional second day workshop available.

**DATE:** November 5, 2020

**TIME:** Registration opens at 8:00 a.m., 9:00 a.m. – 5:00 p.m.

**LOCATION:** National Institute of Standards and Technology (NIST), 100 Bureau Drive, Building 101  
Gaithersburg, Maryland 20899

NIST works to advance the use of scientifically valid methods and techniques, and to improve the understanding of uncertainty and error in the analysis of forensic evidence.

**TOPIC AREAS:** Firearms & Tool Marks      Forensic Genetics  
Digital & Multimedia      Drugs/Toxins  
Statistical Methods for Forensics      Trace

### APPLICATION OF DART-MS IN FORENSIC SCIENCE WORKSHOP – NOV. 6:

Includes: technique fundamentals, labs currently using the technique, research being conducted for next generation applications, and hands-on portion. Limited seating.

**ORGANIZER:** NIST's Special Programs Office,  
Forensic Science Research Program

**INFORMATION:** <https://www.nist.gov/topics/forensic-science>

**November 5, 2020**

**Morning plenary sessions  
(will be webcast)**

**Afternoon breakout sessions  
by disciplines (not webcast)**

**DNA research activities  
Firearms (3D imaging)  
Drug analysis  
Digital evidence  
Trace analysis  
Statistical analysis**

Workshops (on the following day)

- 1) DART-MS in Forensic Science
- 2) Forensic Cannabis Quality Assurance

<https://www.nist.gov/news-events/events/2020/11/forensicsnist>

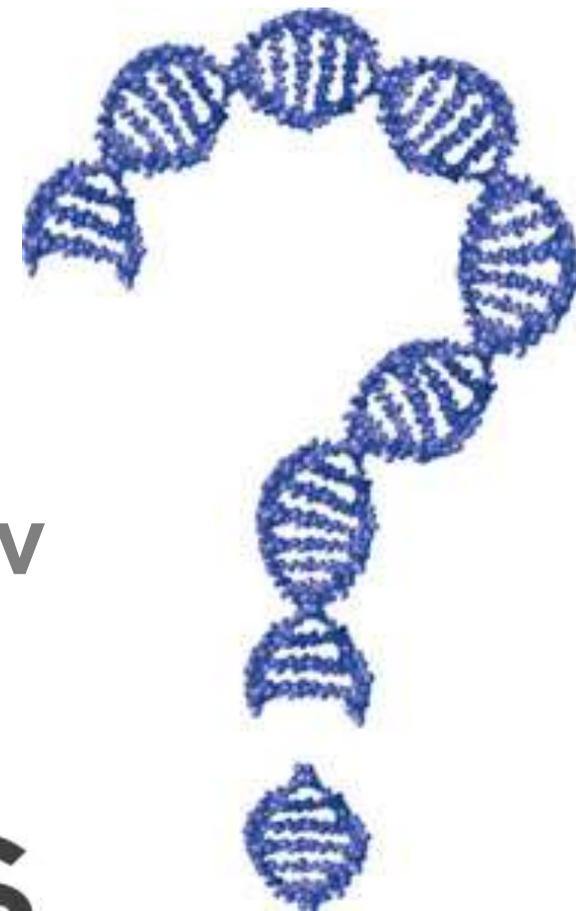
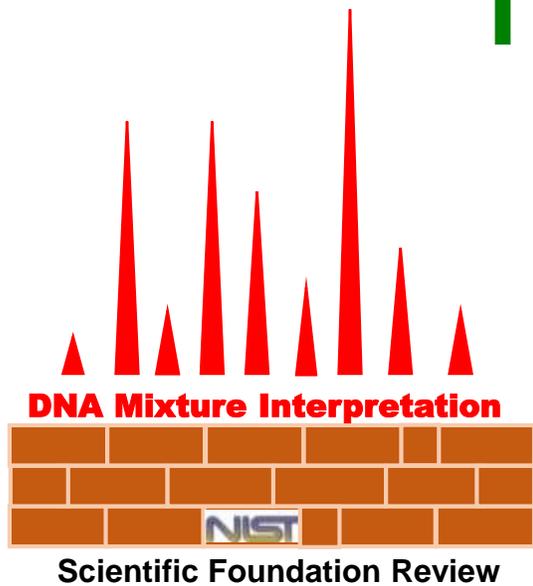
# Thank you for your attention!

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[www.nist.gov/forensics](http://www.nist.gov/forensics)